AMENDMENT

IN THE CLAIMS

Please amend the claims as shown in Appendix A according to the revision to 37 C.F.R. §1.121 concerning a manner for making claim amendments.

REMARKS

Claims 1-3 and 15-29 are pending in the captioned application prior to the enclosed amendment. Subject to the amendment filed herewith, claims 1-3, 16-22 and 25-26 will be currently pending in the captioned application.

Claims 1, 16, 21 and 25-26 have been amended.

Claims 17-20 and 22 are as previously presented.

Claims 4-15, 23-24 and 27-29 are canceled without disclaimer or prejudice as to the subject matter contained therein.

Claims 2-3 are as originally filed.

The amendment to claim 1 adds the limitations of the entire laminated foam having a thickness of 3-8 mm. Support can be found at page 10, line 27. Claim 1 now also recites the limitation of a closed cell ratio of at least 60% as described in claim 24 and at

page 16, lines 18-20. The claim further recites that polyolefin foam is co-extruded by a foaming method and has a xylene soluble content of 0 to 5 wt%. Support for the xylene soluble content can be found at page 14, lines 6-16.

Amended claim 1 further recites a polymer type antistatic agent-containing outermost layer having a surface resistivity of $1x10^3$ Ω or less. Support can be found in canceled claim 15. The limitation of melt flow rates α, β of 3-35 g/10 min and their ratio α/β of at least 0.5 is supported at page 28, line 5 and in claim 23, respectively.

Applicants submit herewith a § 1.132 Declaration by one of the co-inventors, Takashi Muroi, ("Muroi") showing unexpected antistatic properties of the presently claimed melt flow rates α, β of 3-35 g/10 min when their ratio α/β is at least 0.5. A comparison of the closest prior art as shown in Table III of the Declaration unexpectedly shows that the claimed ratio α/β imparts the required antistatic properties.

Accordingly, Applicants respectfully request the Examiner to enter the amendments, carefully reconsider the rejections and allow all claims pending in this application.

1. **Rejection of Claims 1-3 and 27-29 under 35 U.S.C. § 103(a)**

The Office Action rejects claims 1-3 and 27-29 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,492,741 ("Akao et al.") The Office Action states:

> With regard to newly added claims 27-29, it appears that the cushioning sheet of Akao is made of a polyolefin foam (column 3, lines 57-60) as recited in the claims, it is not seen that the polyolefin foam would have been performed differently from that of the present invention in terms of the ratio of insoluble components in boiling xylene. This is in line with *In re Spada*, 15 USPQ 2d 1655 (1990) which holds that products of identical chemical composition cannot have mutually exclusive properties. Like foam material should have like properties.
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> The art rejections have been maintained for the following reasons. Applicants argues there would be no motivation to increase the thickness of the resin layer laminated onto the foam because such would destroy the cell structure on the surface part of the foam during the co-extrusion process, thereby reducing the density and strength of the laminated product. As recognized by Applicant, the Akao invention is related to a hot-foaming method while the present invention is directed to a co-extrusion foaming process. It appears that the adhesive is used to laminate the resin layer onto the foam sheet after the foaming process. As pointed out by Applicant, an unfoamed sheet is created during the hot foaming method as described in the Akao invention. It is the examiner's position that since the foam cells are protected from the outside environment by the unfoamed sheet, it is not seen that any cell destruction would

be resulted from increasing the thickness of the resin layer during the adhesive lamination as discussed by Applicant. Further, Applicant argues that the hot foaming process of the Akao invention is unrelated to the present invention. The arguments are not found persuasive because they are not commensurate with the scope of the claims. It is reminded that the claims are directed to a product and nothing specific about the process limitation is included in the claims. Finally, Applicant argues that Akao fails to teach each and every claimed limitation of the present invention. The examiner disagrees. Akao teaches a packaging material comprising a polyolefin foam layer 1 having a density of less than 0.5 g/cm^3 (abstract), a plurality of polyolefin layers 3a, 7a, 7a', 3a' laminated on at least one side of the polyolefin foam (figure 3). The outermost and innermost polyolefin layers 3a, 3a' have the same thickness of 25 microns and a melt flow rate of 5.0 g/10 min (column 47, lines 46 and 55). The packaging material has the foam density, the thickness of the outermost layer and the melt flow rate of the innermost layer meeting the specific ranges required by the claims. Akao fails to meet the thickness range of the innermost layer. However, since the thickness of the innermost layer is not critical to providing unexpected technical advantages, such a variable would have been recognized by one skilled in the art as dependent upon the intended use of the product. As such, in the absence of unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the innermost layer 3a having a thickness instantly claimed motivated by the desire to improve the adhesion and strength of the laminate. This is in line with *In re Aller*, 105 UPSQ 233 which holds that discovering the optimum or workable ranges involves only routine skill in the art.

Applicants respectfully traverse the rejections because Akao et al. does not teach each and every one of the presently claimed limitations of the newly amended independent claim 1. Akao et al. fails to teach polyolefin foam made by a co-extrusion foaming method and having a xylene soluble content of 0 to 5 wt%, a laminated foam of 3 to 8 mm and having a closed cell ratio of the laminated foam of no less than 60% wherein the outermost layer contains a polymer type antistatic agent so that a surface layer resistivity is no more than $1 \times 10^{13}\ \Omega$ and wherein a ratio (α/β) of a melt flow rate (α) of the polymer type antistatic agent and a melt flow rate (β) of the base resin constituting the outermost layer among the polyolefin layers is no less than 0.5 and β is 3 to 35 g/10 min.

Moreover, the presently claimed MFR ratio α/β unexpectedly results in laminated foams that exhibit antistatic properties. The cited reference completely fails to teach the presently claimed α/β ratios imparting antistatic properties and fails to provide one of ordinary skill in the art any motivation or suggestion to make such a limitation. The lack of the *prima facie* case along with the overwhelming evidence of unexpected results provided in the Muroi Declaration gives rise to a patentable invention. Moreover, claims 27-29 are canceled and the corresponding rejection is now moot.

Turning to the rule, the Federal Circuit held that a *prima*

facie case of obviousness must establish: (1) some suggestion or motivation to modify the references; (2) a reasonable expectation of success; and (3) that the prior art references teach or suggest all claim limitations. Amgen, Inc. v. Chugai Pharm. Co., 18 USPQ2d 1016, 1023 (Fed. Cir. 1991); In re Fine, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); In re Wilson, 165 USPQ 494, 496 (C.C.P.A. 1970).

However, even if a *prima facie* case of obviousness has been established, secondary considerations such as commercial success, long felt but unsolved need, failure of others, and unexpected results may nevertheless give rise to a patentable invention. Graham v. John Deere Co., 148 U.S.P.Q. 459 (1966). For example, evidence such as superiority in a property the compound shares with the prior art can rebut a *prima facie* case of obviousness. See In re Chupp, 816 F.2d 643, 646, 2 USPQ2d 1437, 1439 (Fed. Cir. 1987).

In the present application, independent claim 1 recites a multiple layers laminated polyolefin foam having a plurality of polyolefin layers laminated on at least one side of a polyolefin foam by a co-extrusion foaming method and a xylene soluble content of 0 to 5 wt%, wherein the following new limitations are added:

> a thickness of an entire laminated foam is 3 to 8 mm and a closed cell ratio of the laminated foam is no less than 60%,

wherein the outermost layer contains a polymer type antistatic agent so that a surface layer resistivity is no more than $1 \times 10^{13}\ \Omega$,

wherein a ratio (α/β) of a melt flow rate (α) of the polymer type antistatic agent and a melt flow rate (β) of the base resin constituting the outermost layer among the polyolefin layers is no less than 0.5 and β is 3 to 35 g/10 min.

However, Akao et al. fails to teach the presently claimed limitations directed to the thickness of an entire laminated foam, an outermost layer containing a polymer type antistatic agent such that a surface layer resistivity is no more than $1 \times 10^{13}\ \Omega$, a ratio (α/β) of a melt flow rate (α) of the polymer type antistatic agent and a melt flow rate (β) of the base resin constituting the outermost layer among the polyolefin layers is no less than 0.5 and β is 3 to 35 g/10 min.

Instead of teaching the presently claimed limitations, the teachings of Akao et al. relate primarily to a packaging material and bag for photographic film. The packaging material of Akao et al. comprises a cushioning sheet having a density of less than 0.5 g/cm^3, a wear-resistant heat-resistant flexible sheet having a Young's modulus of not less than 50 kg/mm^2 provided on one side of

the cushioning sheet, and a wear-resistant flexible sheet having a Young's modulus of not less than 50 kg/mm^2 provided on the other side of the cushioning sheet, wherein an outermost layer has heat sealability.

Akao et al. also relates to a cross-linked polyolefin foam sheet that is made by a normal-pressure hot-foaming method rather the presently claimed co-extrusion foaming process. The difference is critical because in the hot-foaming method of Akao et al., a molten resin containing a cross-linking agent and a decomposable foaming agent is extruded at a temperature that is below the reaction temperature of the cross-linking agent and which is also below the decomposition temperature of the foaming agent.

The unfoamed sheet of Akao et al. is then heated to a temperature of at least the reaction temperature of the cross-linking agent thereby forming a cross-linked unfoamed sheet. The unfoamed sheet of Akao et al. is then further heated to a temperature of at least the decomposition temperature of the foaming agent, thereby resulting in foaming. On the other hand, the presently claimed foamed layer is foamed under pressure and is **not** foamed by manipulating temperatures.

Regarding the Office Action's allegation that the polyolefin foam of the invention as defined in claims 27-29 is the same as that of Akao, Applicants note that the rejection is now moot due to

the cancellation of claims 27-29. However, Applicants note for the record that the foam sheet of Akao et al. is a crosslinked foamed polyolefin resin sheet whereas the foam of the present invention is non-crosslinked.

The crosslinked polyolefin foam sheet of Akao et al. has a degree of crosslinking (a boiling xylene-insoluble content) of not less than 10%. In contrast, the **non**-crosslinked polyolefin foam of the present invention has a smaller boiling xylene-insoluble content of 0 to 5 wt%. See specification at page 14, lines 6-19.

Akao et al., on the other hand, teaches a cross-linked thermoplastic resin foamed sheet of not less than 10%. As already discussed, the foam sheet of Akao et al. is prepared by a method in which a melt containing a crosslinking agent and a decomposition-type blowing agent is extruded at a temperature lower than the decomposition temperature of the blowing agent and the reaction temperature of the crosslinking agent to obtain a foamable sheet wherein the foamable sheet of Akao et al. is then heated at a temperature higher than the reaction temperature of the crosslinking agent. The resulting crosslinked foamable sheet is further heated to a temperature higher than the decomposition temperature of the blowing agent to obtain the foam sheet wherein the crosslinking of Akao et al. is indicative of the xylene insoluble component disclosed by Applicants.

In other words, Akao et al. requires a degree of crosslinking of at least 10 % whereas the presently claimed xylene insoluble content of 0 to 5 wt% indicates a lower degree of crosslinking outside the range of Akao et al. Notably, a degree of crosslinking can be represented by the xylene insoluble component.

The coextrusion method of the laminated polyolefin foam of the present invention also provides further indicia of non-obviousness. In particular, a first kneaded melt for forming a foam layer containing a non-crosslinked resin and an organic blowing agent such as butane and a second kneaded melt for forming a resin layer containing a polyolefin resin (non-crosslinked) are joined in a die to form a laminated layer. The laminated layers are then extruded under a high pressure through a die orifice to a low pressure atmosphere (*e.g.* atmospheric pressure environment). The layer from the first melt is then permitted to foam and expand thereby obtaining a laminated foam having a resin layer laminated on the foam layer.

Notably, cells on a surface portion made during a coextrusion method of the foam layer from the first melt are generally destroyed when brought into contact with a layer from the second melt during coextrusion. This results in a reduction of the closed cell content and, hence, in reduction of expansion ratio as well as mechanical strength. Despite this problem, Akao et al. fails to

teach this destroying phenomenon of cells during co-extrusion foaming.

Akao et al. teaches away from the claimed invention because one of ordinary skill at the time of invention would think that in order to increase the strength of laminated foam, the thickness of the resin layer laminated onto the foam should be increased as pointed out by the Examiner. However, Applicants discovered that cells on a surface part of the foam are destroyed if the thickness of the resin layer laminated onto the foam is increased during co-extrusion.

The resulting cell destruction increases the open cell content and reduces a closed cell ratio thereby reducing the density and strength of the laminated product. Applicants note that this destroying phenomenon of cells was discovered by the Applicants. Akao et al. not only fails to address this problem but is unaware of the problem. As noted earlier, discovery of a hitherto unknown problem is an indication of non-obviousness.

Turning to the newly added limitations, Applicants again note that Fig. 1 of the specification shows where the target density d of the polyolefin foam is the minimum value of 100 g/L in accordance with equation 4. The slope of the equation (1) becomes 0.29(100) and is expressed as $Y \leq 0.29 \cdot 100 \cdot X$. Thus, according to ranges for the melt flow rate X of the polyolefin resin of the

innermost layer and the thickness Y of the innermost layer, the values of the melt flow rate and thickness must fall within the hatched area. Fig.'s 2 and 3 show instances where the density is 150 and 207, respectively.

The condition $Y \leq 0.29dX$ of the formula (1) of claim 1 is required in order to ensure a closed cell ratio of at least 60%. A closed cell ratio of at least 60% cannot be produced when 0.29dX is smaller than the thickness Y of the innermost layer.

Turning to the newly added limitation of a polymer type antistatic agent-containing outermost layer having a surface resistivity of 1×10^3 Ω or less, Applicants note that the limitation is critical for good antistatic efficiency. A polymer antistatic agent forms a network structure of the polymer type antistatic agent in the outermost resin layer. When a multiple layer laminated polyolefin foam does not contain the claimed antistatic agent, a suitable network structure is not formed and good antistatic efficiency cannot be produced.

Finally, turning to the Muroi Declaration, Applicants note that the melt flow rates α, β of 3-35 g/10 min and their ratio α/β of at least 0.5 are critical to providing a composition having the required antistatic properties. As shown in the Experiments 1 and 2 of the Muroi Declaration, the MFR ratio α/β of resins of Experiments 1 and 2 is 0.3 and 0.4 and resulted in laminated foams

that do not exhibit satisfactory antistatic properties. In contrast, the α/β ratios of the present invention which demonstrate at least one order of 10 lower surface resistivity are in a range between 2.2 to 10. See Table II of Muroi Declaration. Those of the claimed invention clearly show unexpected results over the Akao et al. reference, which fails to teach α/β ratios.

In summary, the normal-pressure foaming technique of Akao et al. is unrelated to the present invention and furthermore fails to teach each and every claimed limitation of the present invention. The present invention provides a non-crosslinked laminated foam prepared by coextrusion and having a closed cell ratio of at least 60% having good mechanical properties such as bending strength with a thickness of 3-8 mm, a foam layer with a density of 100-300 g/L and good antistatic properties and good appearance.

The foam sheet of Akao, on the other hand, is constructed to exhibit good abrasion resistance and light-shielding properties; is intended to be used as a packaging material for photographic photosensitive articles; and is produced by a method in which a crosslinked resin is foamed at a relatively low temperature and under ambient pressure.

Accordingly, Applicants respectfully submit that the presently claimed invention is unobvious over Akao et al. and respectfully request reconsideration and withdrawal of the rejections of claims

1-3 and 27-29 under 35 U.S.C. § 103.

2. **Rejection of Claims 15-26 under 35 U.S.C. § 103(a)**

The Office Action rejects claims 15-26 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,492,741 ("Akao et al.") as applied to claim 1 above, further in view of U.S. Patent No. 6,316,587 ("Sheen et al."). The Office Action states:

> With regard to claims 17-20, Applicant argues that there is no connection between the description in Sheen et al. and the present invention. The examiner disagrees. Akao discloses the packaging material comprising an antistatic agent in the outermost layer of the packaging material in an amount of 0.01 to 10 wt% (column 42, lines 1-4). Sheen, however, discloses an antistatic agent comprising a polyetheresteramide to impart the packaging material with antistatic properties (column 1, lines 18-20 and column 4, lines 54 et seq.). This is important to the expectation of successfully practicing of the Akao invention, thus suggesting the modification. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the antistatic agent as taught in Sheen motivated by the desire to impart the packaging material with antistatic properties.
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> Akao does not specifically disclose how the polyetheresteramide is prepared. Sheen teaches that the polyetheresteramide is obtained by reacting of a polyamide with an alkylene oxide adduct of a bisphenol. Sheen does rectify the missing feature in the Akao invention. Therefore, it would have been

> obvious to one having ordinary skill in the art at the time the invention was made to employ the method of synthesizing the polyetheresteramide as taught in Sheen because such is a typical and practical process of making the antistatic agent. With regard to claims 24-26, Akao teaches the packaging material comprising a foam sheet of closed-cell type having a thickness ranging from 100 microns to 5mm (column 3, lines 40-45). It appears that the total thickness of other layers in the packaging material is relatively thin to the thickness of the foam layer. It is the examiner's position that the thickness of the packaging material is the thickness of the foam sheet in the range of 100 microns to 5 mm, within the claimed range.

Applicants respectfully traverse the rejection because a *prima facie* case of obviousness has not been established over the independent claim 1. Moreover, claim 15 and 23-24 have been deleted and therefore, the rejection over those claims are moot. The rejection over the remaining dependent claims 16-22 and 25-26 is similarly traversed over the arguments as provided <u>supra</u> because all the limitations of the independent claim 1 are incorporated in the dependent claims.

Accordingly, Applicants respectfully submit that the presently claimed invention is unobvious over the cited references and respectfully request reconsideration and withdrawal of the rejections of claims 15-26 under 35 U.S.C. § 103.